

(21) Application No 9312310.7

(22) Date of filing 15.06.1993

(30) Priority data

(31) 07899458

(32) 16.06.1992

(33) US

(71) Applicant
Illinois Tool Works Inc

(Incorporated in the USA – Delaware)

3600 West Lake Avenue, Glenview, Illinois 60025-5811,
United States of America(72) Inventor
Henry L Swain

(74) Agent and/or Address for Service

Gill Jennings & Every

Broadgate House, 7 Eldon Street, London, EC2M 7LH,
United Kingdom(51) INT CL⁵

A44B 19/16 19/32

(52) UK CL (Edition L)

E2S SBX SEA

U1S S2312 S2322 S3025

(56) Documents cited

GB 1145325 A

US 4947525 A

US 4372014 A

US 3959856 A

(58) Field of search

UK CL (Edition L) E2S SBB SBX

INT CL⁵ A44B 19/16 19/32

(54) Moisture-resistant fastener or closure

(57) A moisture-resistant fastener or closure, which may be incorporated as part of a bag, pouch, wrapper, or liner, or which may be used as a protective garment closure, includes a pair of flexible closure strips (80, 82). The strips include interlocking ribs and channels of complementary cross sectional shape which lock together in an interference fit. The ribs have enlarged heads, and, complementarily, the channels have enlarged bottoms. The enlarged heads or enlarged bottoms have an integrally formed longitudinal gasket (30) of a polymeric material softer than that used to extrude the flexible closure strips (80, 82). When the flexible closure strips are locked together by forcing the ribs of one into the channels of the other to establish the interference fit, the longitudinal gasket (30) is compressed and forms a moisture-resistant seal having an effectiveness heretofore not available or achievable.

For application to closing protective garments, the closure strips may be constructed so as to both lie on the same side of the centre line of the fastener and be associated with a longitudinal pull tab (92) to effect release.

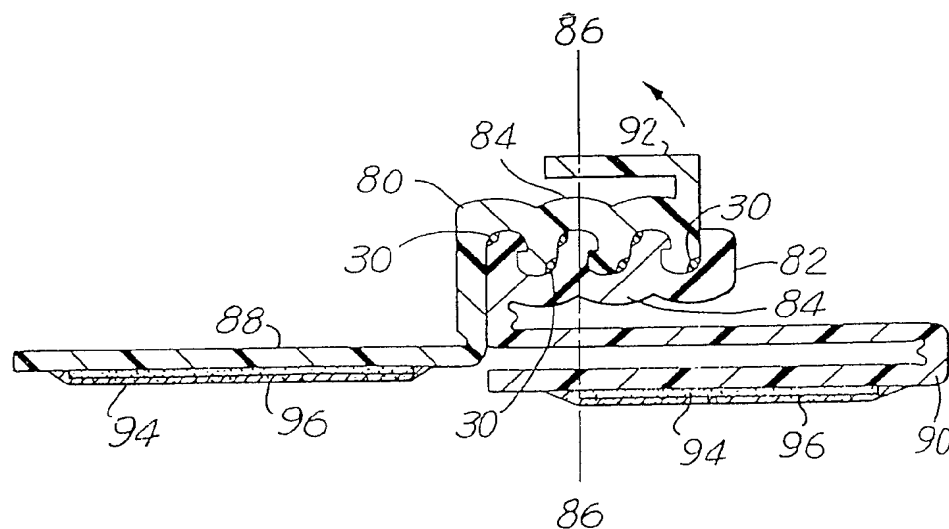


FIG. 8

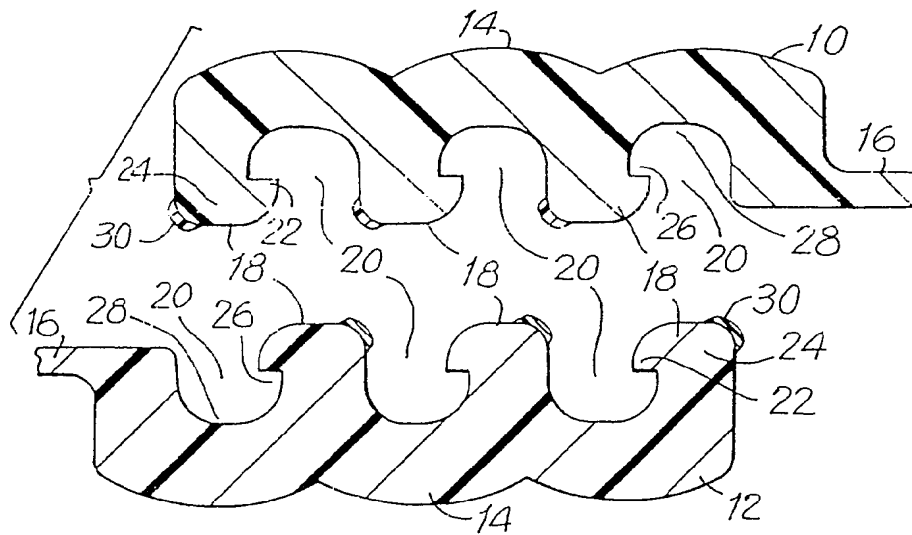


FIG. 1

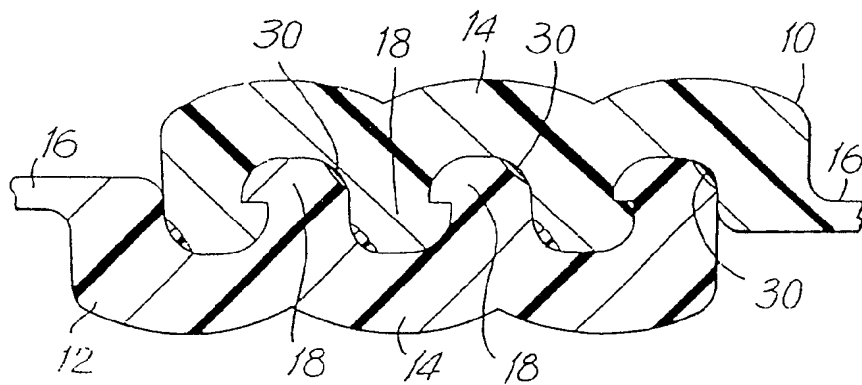


FIG. 2

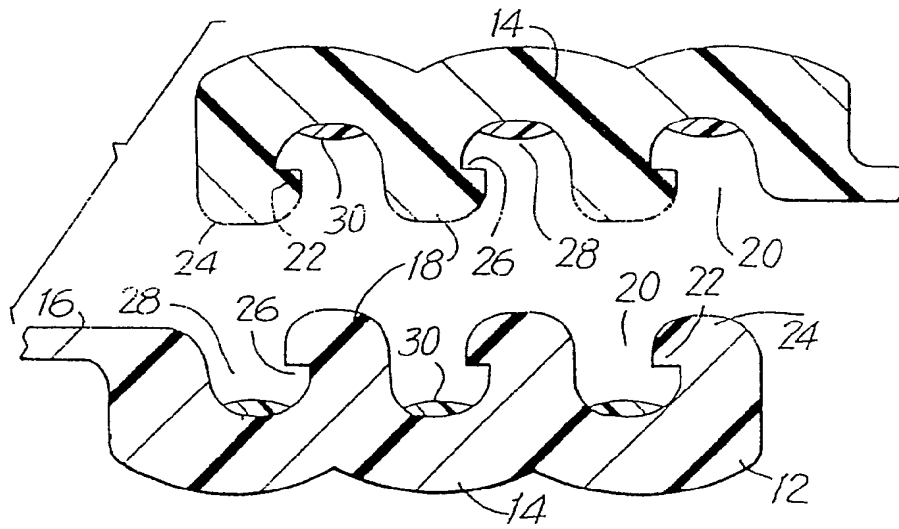


FIG. 3

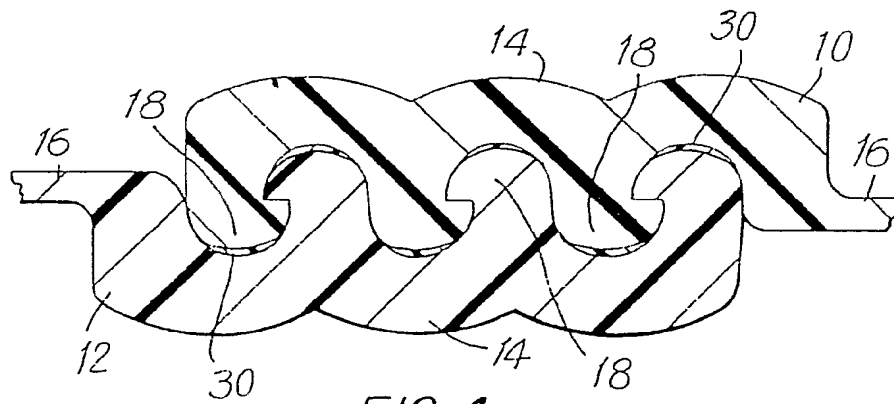


FIG. 4

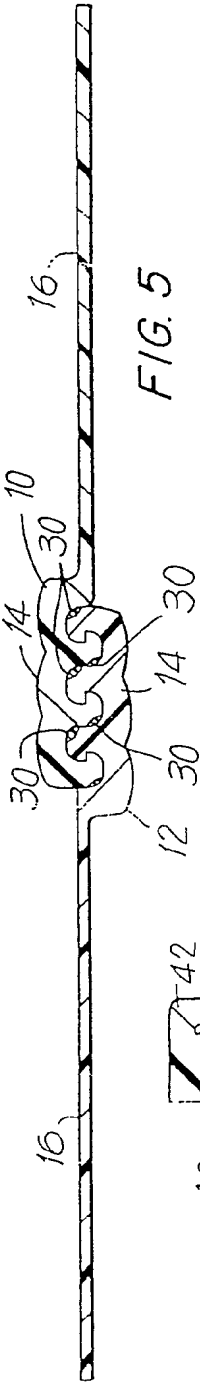


FIG. 5

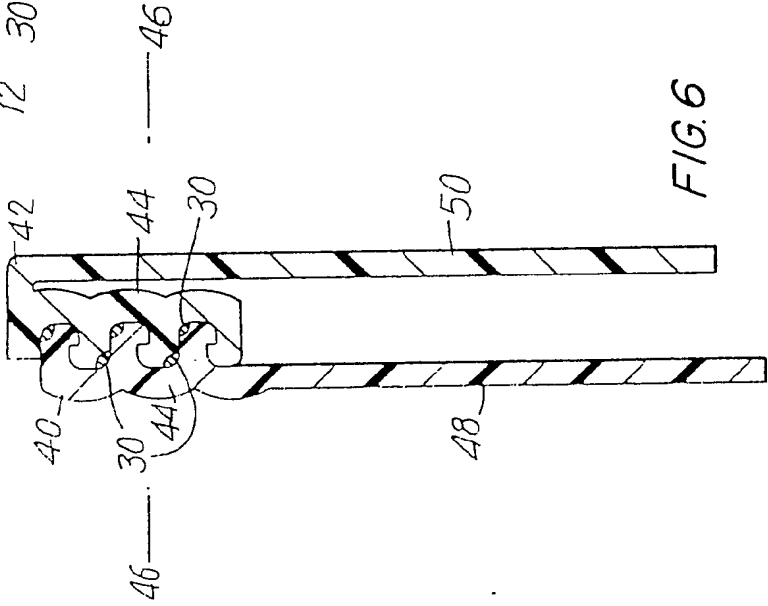


FIG. 6

FIG. 7

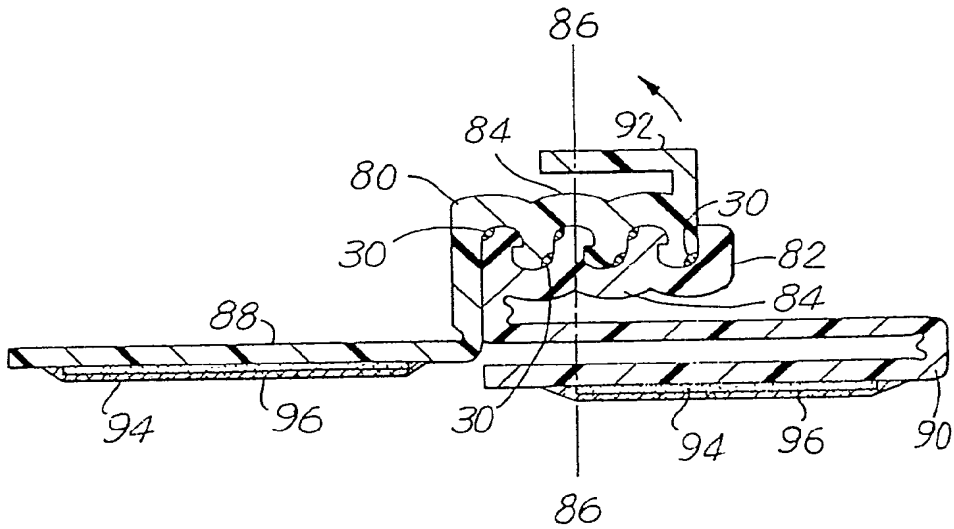
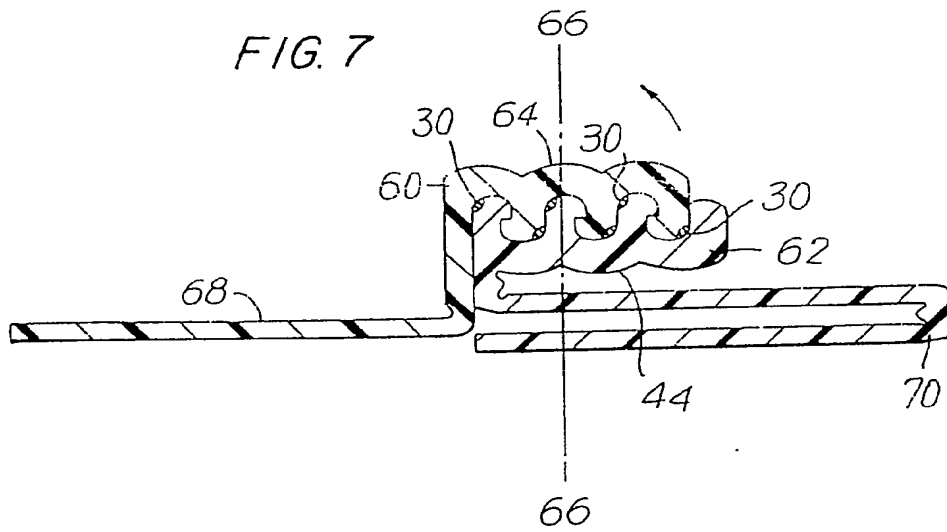


FIG. 8

MOISTURE-RESISTANT FASTENER OR CLOSURE

The present invention relates to improvements in resilient fasteners that provide flexible closures for a variety of different uses such as on bags, pouches, wrappers, liners and protective garments. The present invention, more specifically, relates to a fastener which is more moisture-resistant than those of the prior art.

Resilient fasteners are well known in the art. Generally, fasteners of this variety include a pair of flexible closure strips, each extruded from a polymeric resin material in continuous lengths and having an interlocking rib and groove structure. A leak-proof fastener of this type has long been sought in the industry, but has heretofore not been achieved. The problem, generally stated, is that sufficient clearance must be provided to enable the interlocking ribs and grooves to fit together when the fastener is being closed. The need for this clearance has made the provision of a completely leak proof slide fastener difficult, as fluid or vapour has been ultimately able to pass through the closed fastener by way of the clearance spaces between its interlocked ribs and grooves.

According to a first aspect of this invention, a moisture-resistant fastener comprises:

a first flexible closure strip and a second flexible closure strip, each flexible closure strip having a web portion and a marginal strip portion, said marginal strip portions of said first and second closure strips being formed of a first polymeric material;

said marginal strip portion of said first flexible closure strip having at least one solid form-retaining longitudinal rib having an undercut interlocking hook along one side of it to form an enlarged head;

said marginal strip portion of said second flexible closure strip having at least one longitudinal channel having an undercut interlocking groove along one side of it

to form an enlarged bottom, said channel being generally complementary to said rib of said first flexible closure strip so that said rib interlocks with it with an interference fit when said hook is engaged within said groove;

5 said head on said longitudinal rib of said first flexible closure strip or said bottom of said longitudinal channel of said second flexible closure strip having an integrally formed longitudinal gasket of a second

10 polymeric material softer than said first polymeric material, so that a moisture-resistant seal is formed between them when said longitudinal rib of said first flexible closure strip is forced into said longitudinal channel of said second flexible closure strip to establish
15 said interference fit.

 The first aspect of the invention provides a moisture-resistant fastener for incorporation as part of a bag, pouch, wrapper or liner.

20 Preferably the integrally formed longitudinal gasket is formed by co-extrusion. Whether the gasket is in the bottom of the channel or on the head of the rib, when viewed in cross section it has the appearance of a bead. Since this bead is of a softer material than the rib or channel material when the rib is forced into the channel to
25 establish an interference fit and to close the moisture-resistant fastener, the integrally formed gasket is compressed there-between to close off any clearance space and to render the closed fastener more moisture-resistant than has been heretofore possible.

30 According to a second aspect of this invention, a protective garment closure comprises:

 a first flexible closure strip and a second flexible closure strip, each flexible closure strip having a web portion and a marginal strip portion, said marginal strip
35 portions of said first and second closure strips being formed of a first polymeric material;

said marginal strip portion of said first flexible closure strip having at least one solid form-retaining longitudinal rib having an undercut interlocking hook along one side thereof to form an enlarged head;

5 said marginal strip portion of said second flexible closure strip having at least one longitudinal channel having an undercut interlocking groove along one side thereof to form an enlarged bottom, said channel being generally complementary to said rib of said first flexible
10 closure strip so that said rib may interlock with it with an interference fit when said hook is engaged within said groove;

 said head on said longitudinal rib of said first flexible closure strip or said bottom of said longitudinal
15 channel of said second flexible strip having an integrally formed longitudinal gasket of a second polymeric material softer than said first polymeric material, so that a moisture-resistant seal is formed there-between when said longitudinal rib of said first flexible closure strip is
20 forced into said longitudinal channel of said second flexible closure strip to establish said interference fit;

 said web portion of said first flexible closure strip being attached to its respective marginal strip portion at a point on one side of a centre line of said interlocked
25 marginal strip portions, and said web portion of said second flexible closure strip is attached to its respective marginal strip portion at a point on the same side of the centre line of said interlocked marginal strip portions, said web portions of said first and second flexible closure
30 strips extending in opposite directions from said interlocked marginal strip portions and lying in a substantially common plane, said web portion of said second flexible closure strip being longitudinally folded upon itself in a direction away from its respective marginal strip portion,
35 so that said web portion of said second flexible closure strip is double-layered and expandable in the manner of a Z-fold;

said web portion of said first flexible closure strip having a side facing away from said interlocked marginal strip portions and said folded web portion of said second flexible closure strip having a side facing away from said interlocked marginal strip portions, said sides having a coating of an adhesive, so that said protective garment closure may be attached to a protective garment with said web portion of said first flexible closure strip being attached to one side of an opening in the protective garment and said folded web portion of said second flexible closure strip being attached to the other side of the opening in the protective garment.

The second aspect of the present invention provides a fastener which acts as a protective garment closure for a plastic coverall of the variety worn by workers in areas contaminated by asbestos or radioactivity, emergency medical personnel, ambulance drivers, and the like. The closure portions, that is, the marginal strip portions, of the protective garment closure, are identical to those described above, and, as a consequence, have a level of moisture-resistance not available in the protective garment closures of the prior art.

In the protective garment closure of the present invention, the web portions of the flexible closure strips have been adapted for use in this specific purpose. One of the two web portions is flat, or planar, and has, on one of its two surfaces, a layer of adhesive, so that it may be applied and adhered to an edge of an opening in a protective garment. The adhesive may, in turn, have a coating of wax, particularly where the adhesive is of the sort that may be activated by heat. Alternatively, the adhesive may be pressure-sensitive, and may be covered by a strip of paper or plastic to be removed immediately before the application of the web portion along the edge of an opening in a protective garment.

The other web portion has a longitudinally folded portion, so that, in effect, the web portion is double-

layered. The backside of the folded portion facing away from the marginal strip portions, is also coated with a layer of adhesive in the manner described above, so that the web portion may be applied and adhered to the other edge of the opening in a protective garment. The folded web portion allows the closed protective garment to give or expand somewhat in response to the movements of its wearer without placing an undue strain on the interlocked marginal strip portions themselves.

When used as a protective garment closure, the web portions of the flexible closure strips are attached to the interlocked marginal portions at the same side of a centre line there-through. This permits the marginal strip portions of the protective garment closure to be pivoted outward by 90 from the body of the wearer, who may then seal them together by running a thumb and forefinger, squeezing the marginal strip portions together, up the closure. Once closed, the protective garment closure turns back parallel to the body of the wearer of its own accord. One of the two marginal strip portions may be provided with a longitudinal pull-tab to facilitate the opening of the garment closure following use.

Various embodiments of fasteners and closures in accordance with this invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a cross section of two flexible closure strips prior to their being interlocked with one another;

Figure 2 is a cross section of two flexible closure strips shown in Figure 1 interlocked with one another as in a closed fastener;

Figure 3 is a cross section of two flexible closure strips of an alternate embodiment of the present invention prior to their being interlocked with one another;

Figure 4 is a cross section of the two flexible closure strips shown in Figure 3 interlocked with one another as in a closed fastener;

Figure 5 is a cross section of an embodiment of the moisture-resistant fastener of the present invention;

Figure 6 is a cross section of another embodiment of the moisture resistant fastener of the present invention;

5 Figure 7 is a cross section of still another embodiment of the moisture-resistant fastener of the present invention; and,

10 Figure 8 is a cross section of yet another embodiment of the moisture-resistant fastener, one particularly adapted for use as a protective garment closure.

15 In Figure 1, a pair of flexible closure strips of the moisture-resistant fastener of the present invention is shown. The first flexible closure strip 10 and the second flexible closure strip 12 are, as shown in Figure 1, identical to one another, so that elements of one described and labelled in the paragraphs to follow, may be described in identical terms, and are identically labelled in the Figures.

20 The flexible closure strips 10, 12 each have a marginal strip portion 14 and a web portion 16, the latter of which is not completely shown. The marginal strip portions 14 have solid form-retaining longitudinal ribs 18 and longitudinal channels 20. The ribs 18 have an undercut interlocking hook 22 on one side thereof which forms an enlarged head 24. In like manner, the channels 20 have an undercut interlocking groove 26 and an enlarged bottom 28. The channels 20 are generally complementary to the ribs 18, so that they may lock together, as shown in Figure 2, in an interference fit by the engagement of hooks 18 with grooves 26.

30 At a point along the head 24 of each longitudinal rib 18 is an integrally formed longitudinal gasket 30 which forms a moisture-resistant seal when the flexible closure strips 10, 12 are interlocked as shown in Figure 2. The flexible closure strips 10, 12 are extruded from a first polymeric material, while the gasket 30 is co-extruded from a second polymeric material, compatible with the first, at

the same time. As a consequence, gasket 30 is integrally connected to the flexible closure strips 10, 12. The second polymeric material is of a variety having a lower hardness than the first polymeric material. As may be noted by comparing Figures 1 and 2, gaskets 30, having the appearance of beads in Figure 1, are substantially compressed when the flexible closure strips 10, 12 are interlocked with one another. This compression provides the desired moisture-resistant seal between ribs 18 and channels 20 when the two are interlocked together.

With reference now to Figures 3 and 4, which show an alternate embodiment of the present invention, much of the preceding discussion is equally applicable thereto and will not be repeated. Reference numerals, used in Figures 1 and 2, are used in Figures 3 and 4 to refer to corresponding elements of the moisture-resistant fastener shown therein. The difference in this alternate embodiment is that an integrally formed longitudinal gasket 30 is provided at a point along the bottom 28 of each longitudinal channel 20. Nevertheless, gaskets 30 are substantially compressed when the flexible closure strips 10, 12 in Figure 3 are interlocked with one another, as shown in Figure 4. This compression again provides the desired moisture-resistant seal between ribs 18 and channels 20 when the two are interlocked together.

The first polymeric material may be a low to medium density polyethylene, or polypropylene or polyurethane. In general, it may be a polymeric material having a hardness in the range from 60 to 95 durometer.

The second polymeric material may be thermoplastic rubber (TPR) or styrene ethylene butyrene styrene block copolymer (SEBS). In general, it may be a polymeric material having a hardness in the range from 20 to 55 durometer, so long as it is compatible for the purposes of co-extrusion with the material used as the first polymeric material.

Figure 5 shows an embodiment of the present invention in cross section wherein the first flexible closure strip 10 and the second flexible closure strip 12 are substantially identical to one another so that, when their respective marginal strip portions 14 are interlocked with one another in an interference fit, their respective web portions 16 lie on opposite sides of the interlocked marginal strip portions 14 in a substantially common plane. This embodiment of the present moisture-resistant fastener may be used in joining sheets of plastic material to form a liner of considerable area.

Figure 6 shows an embodiment of the present invention useful for inclusion in a sealable plastic bag or pouch. In this instance, the first flexible closure strip 40 and the second flexible closure strip 42 are not identical to one another.

Continuing to use the same terminology as above, marginal strip portions 44 in Figure 6 are shown in an interlocked condition and include longitudinal gaskets 30. Referring to a centre line 46, which may be drawn through interlocked marginal strip portions 44, the web portion 48 of first flexible closure strip 40 is on one side of the centre line 46, while web portion 50 of second flexible closure strip 42 is on the other side of the centre line. Both web portion 48 and web portion 50, however, extend in a substantially common direction to their respective marginal strip portions 44.

Figure 7 shows still another embodiment of the present invention. This, and the embodiment to be shown in Figure 8, are useful as protective garment closures. Again, the first flexible closure strip 60 and the second flexible closure strip 62 are not identical to each other.

Marginal strip portions 64 in Figure 7 are shown in interlocked condition and include longitudinal gaskets 30. Referring to a centre line 66, which may be drawn through interlocked marginal strip portions 64, the web portion 68 is on one side of the centre line 66, and web portion 70 of

second flexible closure strip 62 is on the same side of the centre line 66. This permits the marginal strip portions 64 to be pivoted outward in the direction indicated by the curved arrows from the web portions 68, 70.

5 Both web portion 68 and web portion 70 extend in opposite directions from their points of attachment to their respective marginal strip portions 44 in a substantially common plane. However, web portion 70 has a longitudinal fold, so that, in effect, it is double-layered.

10 Figure 8 shows a refinement of the embodiment shown in Figure 7. This embodiment may be more useful than that shown in Figure 7 as a protective garment closure.

Again, the first flexible closure strip 80 and the
15 second flexible closure strip 82 are not identical to each other. Marginal strip portions 84 in Figure 8 are shown in interlocked condition and include longitudinal gaskets 30. Referring to centre line 86, which may be drawn through interlocked marginal strip portions 84, the web portion 88
20 of the first flexible closure strip 80 is on one side of the centre line 86, and the web portion 90 of the second flexible closure strip 82 is on the same side of the centre line 86. This permits the marginal strip portions 84 to be pivoted outward in the direction indicated by the curved
25 arrow from the web portions 88, 90 to facilitate their being interlocked by hand when the protective garment closure shown in Figure 8 is included in a protective garment.

Both web portion 88 and web portion 90 extend in
30 opposite directions from their points of attachment to their respective marginal strip portions 84 in a substantially common plane. However, web portion 90 has a longitudinal fold, so that, in effect, it is double-layered. It should be noted in this regard that second flexible closure
35 strip 62 in Figure 7 and second flexible closure strip 82 in Figure 8 are extruded through dies shaped to provide providing web portions 70, 90 with the longitudinal fold.

First flexible closure strip 80 may also be provided with a longitudinal pull-tab 92 to enable the wearer of a protective garment with which the present invention is used to open the closure.

- 5 Referring to the sides of web portions 88, 90 facing away from marginal strip portions 84, and adhesive layer 94 may be applied on each to enable the first flexible closure strip 80 and the second flexible closure strip 82 to be attached to opposite sides of an opening in a protective
- 10 garment. A layer of wax 96 may be used to cover the adhesive 94, particularly where the adhesive 94 is heat-activated. The adhesive 94 may alternatively be pressure-sensitive.

C L A I M S

1. A moisture-resistant fastener, comprising:

5 a first flexible closure strip and a second flexible closure strip, each flexible closure strip having a web portion and a marginal strip portion, said marginal strip portions of said first and second closure strips being formed of a first polymeric material;

└ 10 said marginal strip portion of said first flexible closure strip having at least one solid form-retaining longitudinal rib having an undercut interlocking hook along one side of it to form an enlarged head;

15 said marginal strip portion of said second flexible closure strip having at least one longitudinal channel having an undercut interlocking groove along one side of it to form an enlarged bottom, said channel being generally complementary to said rib of said first flexible closure strip so that said rib interlocks with it with an interference fit when said hook is engaged within said
20 groove;

25 said head on said longitudinal rib of said first flexible closure strip or said bottom of said longitudinal channel of said second flexible closure strip having an integrally formed longitudinal gasket of a second polymeric material softer than said first polymeric material, so that a moisture-resistant seal is formed between them when said longitudinal rib of said first flexible closure strip is forced into said longitudinal channel of said second flexible closure strip to establish
30 said interference fit.

35 2. A moisture-resistant fastener according to claim 1, wherein said first flexible closure strip and said second flexible closure strip are substantially identical to one another so that, when their respective marginal strip portions are interlocked with one another in an interference fit, their respective web portions lie on opposite

sides of said interlocked marginal strip portions in a substantially common plane.

3. A moisture-resistant fastener according to claim 1, wherein said web portion of said first flexible closure strip is attached to its respective marginal strip portion at a point on one side of a centre line of said interlocked marginal strip portions, and wherein said web portion of said second flexible closure strip is attached to its respective marginal strip portion at a point on the other side of the centre line of said interlocked marginal strip portions, said web portions of said first and second flexible closure strips extending in a substantially common direction from said interlocked marginal strip portions.

4. A moisture-resistant fastener according to claim 1, wherein said web portion of said first flexible closure strip is attached to its respective marginal strip portion at a point on one side of a centre line of said interlocked marginal strip portions, and wherein said web portion of said second flexible closure strip is attached to its respective marginal strip at a point on the same side of the centre line of said interlocked marginal strip portions, said web portions of said first and second flexible closure strips extending in opposite directions from said interlocked marginal strip portions and lying in a substantially common plane.

5. A moisture-resistant fastener according to claim 4, wherein said web portion of said second flexible closure strip is longitudinally folded upon itself in a direction away from its respective marginal strip portion, so that said web portion is double-layered and expandable in the manner of a Z-fold.

6. A protective garment closure, comprising:
a first flexible closure strip and a second flexible closure strip, each flexible closure strip having a web portion and a marginal strip portion, said marginal strip portions of said first and second closure strips being formed of a first polymeric material;

said marginal strip portion of said first flexible closure strip having at least one solid form-retaining longitudinal rib having an undercut interlocking hook along one side thereof to form an enlarged head;

5 said marginal strip portion of said second flexible closure strip having at least one longitudinal channel having an undercut interlocking groove along one side thereof to form an enlarged bottom, said channel being generally complementary to said rib of said first flexible
10 closure strip so that said rib may interlock with it with an interference fit when said hook is engaged within said groove;

15 said head on said longitudinal rib of said first flexible closure strip or said bottom of said longitudinal channel of said second flexible strip having an integrally formed longitudinal gasket of a second polymeric material softer than said first polymeric material, so that a moisture-resistant seal is formed there-between when said longitudinal rib of said first flexible closure strip is
20 forced into said longitudinal channel of said second flexible closure strip to establish said interference fit;

25 said web portion of said first flexible closure strip being attached to its respective marginal strip portion at a point on one side of a centre line of said interlocked marginal strip portions, and said web portion of said
30 second flexible closure strip is attached to its respective marginal strip portion at a point on the same side of the centre line of said interlocked marginal strip portions, said web portions of said first and second flexible closure strips extending in opposite directions from said inter-
35 locked marginal strip portions and lying in a substantially common plane, said web portion of said second flexible closure strip being longitudinally folded upon itself in a direction away from its respective marginal strip portion, so that said web portion of said second flexible closure strip is double-layered and expandable in the manner of a Z-fold;

said web portion of said first flexible closure strip having a side facing away from said interlocked marginal strip portions and said folded web portion of said second flexible closure strip having a side facing away from said interlocked marginal strip portions, said sides having a coating of an adhesive, so that said protective garment closure may be attached to a protective garment with said web portion of said first flexible closure strip being attached to one side of an opening in the protective garment and said folded web portion of said second flexible closure strip being attached to the other side of the opening in the protective garment.

7. A protective garment closure according to claim 6, wherein said adhesive is of a heat-activated type and further comprising a coating of wax over said adhesive.

8. A protective garment closure according to claim 6, wherein said adhesive is pressure-sensitive.

9. A moisture-resistant fastener according to claim 4 or 5, or a protective garment closure according to claims 6, 7 or 8, further comprising a longitudinal pull-tab, said longitudinal pull-tab being attached to said marginal strip portion of said first flexible closure strip.

10. A moisture-resistant fastener or a protective garment closure according to any one of the preceding claims, wherein said first polymeric material is a low to medium density polyethylene, or is polypropylene, or is polyurethane.

11. A moisture-resistant fastener or a protective garment closure according to any one of the preceding claims, wherein said first polymeric material has a hardness in the range from 60 to 95 durometer.

12. A moisture-resistant fastener or a protective garment closure according to any one of the preceding claims, wherein said second polymeric material is thermoplastic rubber (TPR), or styrene ethylene butyene styrene block co-polymer (SEBS).

13. A moisture-resistant fastener or a protective garment closure according to any one of the preceding claims, wherein said second polymeric material has a hardness in the range from 20 to 55 durometer.

5 14. A moisture-resistant fastener or a protective garment closure according to any one of the preceding claims, wherein said first polymeric material and said second polymeric material are compatible with one another for co-extrusion.

10 15. A moisture-resistant fastener or a protective garment closure substantially as described with reference to the accompanying drawings.

- 16 -

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

GB 9312310.7

Relevant Technical fields

- (i) UK Cl (Edition L) E2S (SBB, SBX)
- (ii) Int Cl (Edition 5) A44B 19/16, 19/32

Search Examiner

A T BLUNT

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

13 AUGUST 1993

Documents considered relevant following a search in respect of claims 1-15

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X, Y	GB 1145325 (FLEXIGRIP)	X: 1, 2, 4, 10, 11, 13, 14 Y: 3, 5-9
X	US 4947525 (VAN ERDEN)	1
A	US 4372014 (SIMPSON)	1
Y	US 3959856 (AUSNIT)	3, 5-9

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).